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**REMARKS**

At the time of the Office Action dated January 16, 2003, claims 1-65 were pending in this application. Of those claims, claims 1-7 and 15-62 have been rejected and claims 8-14 and 63-65 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. § 1.142(b).

Claims 66-71 have been added. Care has been exercised to avoid the introduction of new matter. Specifically, the limitations of claims 66-71 find adequate descriptive support throughout the originally-filed disclosure, for example, in Tables 6-8 found on pages 14-16. Applicants submit that the present Amendment does not generate any new matter issue.

**Claims 1-7 and 15-21 are rejected under 35 U.S.C. § 103 for obviousness based upon Mitsui et al., U.S. Patent No. 5,942,356 (hereinafter Mitsui), in view of Nagatani et al., JP 08-127870 (hereinafter Nagatani), Isao et al., U.S. Patent No. 5,938,897 (hereinafter Isao), and Yamanishi, U.S. Patent No. 5,322,605**

In the third enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the teachings of Mitsui in view of Isao and Yamanishi to arrive at the claimed invention. This rejection is respectfully traversed.

Independent claims 1 and 15 each recite that a phase shifter film is formed using a reactive long-throw sputtering device. In the statement of the rejection, the Examiner asserted that Mitsui describes forming a phase shifter film of MoSiON. The Examiner, however, admitted on page three of the Office Action that "Mitsui does not teach long-throw sputtering."

The Examiner then asserted that Nagatani "teaches the use of a long-throw sputtering device for coating a metal nitride film." In this regard, Applicants disagree with the Examiner's characterization of the teachings of Nagatani. Nagatani does not teach using a long-throw sputtering device to form a metal nitride film. Instead, Nagatani only teaches the use of a long-throw sputtering device to form a titanium nitride film. By asserting that the teachings of Nagatani relate to metal nitride films, instead of titanium nitride films, the Examiner has improperly broadened the teachings of Nagatani, as one having ordinary skill in the art, when reviewing the teachings of Nagatani, would not believe that the use of a long-throw sputter device has been enabled for all metal nitride films.

With regard to the Examiner's burden of establishing a motivation to combine the applied prior art, the Examiner asserted the following in the paragraph spanning pages three and four of the Office Action:

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Nagatani's longthrow sputtering device with separate gas inlets as taught by Yamanishi, to form Mitsui's film and annealing it as taught by Isao, because Mitsui emphasizes the importance of controlling film thickness and composition (2;6-27) and Nagatani proves that the device provides a film of uniform of [sic] thickness (abstract); Isao teaches that MoSiON films are stabilized with improved optical properties by heat treatment (3;31-35). Yamanishi teaches that the separation of the gases prevents the reaction of the reactive gas with the target; a homogenous film can thus be formed on the substrate (2; 42-56).

The Examiner's asserted motivation for modifying Mitsui in view of Nagatani, therefore, appears to be that Mitsui places importance on controlling film thickness and Nagatani teaches that the use of a long-throw sputtering devices provides a more uniform film thickness. Applicants respectfully submit that the Examiner has failed to establish a reasonable expectation of success for modifying

Mitsui in view of Nagatani to arrive at improved uniformity of film thickness.<sup>2</sup> The sentence relied upon by the Examiner in the Abstract of Nagatani for the assertion that the disclosed method produces an improved uniformity in film thickness is reproduced below:

By this method, the thin titanium nitride film, improved in the filling up characteristics of fine pores and uniformity in film thickness distribution at the surface of the substrate, can be obtained.

Applicants question the Examiner's conclusion that one having ordinary skill in the art would have found it obvious to modify Mitsui in view of Nagatani to use a long-throw sputtering device so as to provide a more uniform film thickness. How can the Examiner assert that the method of Nagatani provides a more uniform film thickness than the method disclosed by Mitsui? Neither Mitsui nor Nagatani disclose the film uniformity characteristics (such as standard deviation of film thickness) of their respective processes. Nagatani does not assert that a deposition method using a long-throw sputtering device provides better film uniformity than the method disclosed by Mitsui. From all that it is disclosed by Nagatani and Mitsui, one having ordinary skill in the art would not know which method provides a more uniform film. As such, it cannot be properly asserted that it would have been obvious to modify Mitsui in view of Nagatani to use a long-throw sputtering device, as the Examiner has provided no clear and particular factual findings that the method of Nagatani is better than the method of Mitsui.<sup>3</sup>

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<sup>2</sup> The requisite motivation to support the legal conclusion of obviousness under 35 U.S.C. § 103 requires not only a suggestion but a reasonable expectation of success as to a particular benefit. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Obvious to try is not the standard. In re O'Farrell, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988); In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Dow Chemical Co., 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir. 1988).

<sup>3</sup> It has been repeatedly held by the Court of Appeals for the Federal Circuit that in order to establish the requisite motivation, the Examiner must make "clear and particular" factual findings as to a specific understanding or specific technological principle which would have realistically impelled one having ordinary skill in the art to modify a particular prior art reference to arrive at the claimed invention based upon facts, not generalizations. Ruiz v. A.B. Chance Co., 234 F.3d 654, 57 USPQ2d 1161 (Fed. Cir. 2000); Ecolchem Inc. v. Southern California Edison, Co., 227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000); In re Kotzab, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000); In re Dembiczak, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999).

Even *assuming arguendo* that the Examiner could establish that the method of Nagatani provides a more uniform film than the film formed by the method of Mitsui, there would still be a lack of a reasonable expectation of success in modifying Mitsui in view Nagatani to arrive at the claimed invention. Nagatani does not disclose in the Abstract exactly what provides the asserted "improved ... uniformity in film thickness distribution." Thus, the improved uniformity in film thickness distribution has not been established as being based upon the use of a long-throw sputtering device. Instead, one having ordinary skill in the art might believe the improvement could be based on other factors, such as the disclosed pressure, flow rate, gas mix, and/or the use of a titanium target. As it is apparent from Nagatani that the asserted benefit does not necessarily derive from using a long-throw sputtering device, the Examiner has failed to establish that one having ordinary skill in the art would expect a reasonable expectation of success in obtaining the asserted benefit (i.e., improved film thickness uniformity) by modifying the teachings of Mitsui to use the long-throw sputtering device of Nagatani.

Taking the Examiner's failure to establish a reasonable expectation of success one step further, even if the Examiner could establish that the long throw sputtering device of Nagatani improves the uniformity in film thickness of the deposited titanium nitride film, the Examiner has not established that this benefit would also apply to phase shifter films. The alleged benefit ascribed to Nagatani is strictly confined to the formation of a titanium nitride film, and the Examiner has failed to establish that Nagatani teaches that other films, such as a phase shifter film, could also benefit by being formed using a long-throw sputtering device. As any benefits taught by the use of a long-throw sputter device are strictly confined to forming titanium nitride films, there are no established facts that would have realistically motivated one having ordinary skill in the art to

use a reactive long throw sputtering device to form a phase shifter film, as recited in claims 1 and 15. Applicants, therefore, respectfully submit that the one having ordinary skill in the art would not have been motivated to modify Mitsui in view of Nagatani to arrive at the claimed invention. The Examiner's other cited references of Yamanishi and Isao do not cure the deficiencies of Mitsui and Nagatani. Applicants, therefore, respectfully submits that the imposed rejection of claims 1 and 15 under 35 U.S.C. § 103 for obviousness is not viable and, hence, solicit withdrawal thereof.

Dependent claims 2 and 16 each recite that a reactive gas and an inert gas are separately introduced into the long throw sputtering device. In the statement of the rejection, the Examiner asserted that Yamanishi teaches "a sputtering device where the discharge gas (inert gas) and the reactive gas are introduced into the chamber by separate inlets." As reproduced above, the Examiner's asserted motivation to combine Yamanishi with Mitsui and Nagatani is that "a homogenous film can thus be formed on the substrate." Initially, Applicants question that Examiner's alleged benefit of using the teachings of Yamanishi. Specifically, Applicants are unable to discover where Yamanishi teaches that separately introducing the gases into the reactive chamber allows for a "homogenous film" to be formed.

Notwithstanding that Yamanishi describes other benefits for supplying the inert gas and the reactive gas into the chamber by separate inlets, the Examiner has failed to establish that Yamanishi teaches that these benefits would also apply to a long-throw sputtering device. In addition, the Examiner has failed to establish that these benefits (even if transferable to a long-throw sputtering device) would also apply when the long-throw sputter device is used to form a phase shifter film.

Yamanishi does not describe what type of films would benefit from separately supplying inert gas and reactive gas into the chamber. As such, there are no established facts that would have realistically motivated one having ordinary skill in the art to separately supply inert gas and reactive gas into a chamber of a long throw sputtering device to form a phase shifter film, as recited in claims 2 and 16. The Examiner's other cited reference of Isao do not cure the deficiencies of Mitsui, Nagatani and Yamanishi. Applicants, therefore, respectfully submit that the imposed rejection of claims 2 and 16 under 35 U.S.C. § 103 for obviousness is not viable and, hence, solicit withdrawal thereof.

With regard to claims 3 and 17, Applicants note that the Examiner has failed to allege where any of the applied references teach or suggest that the reactive gas is introduced into the substrate side and the inert gas is introduced into the target side. Therefore, claims 3 and 17 further distinguish the claimed invention over the applied prior art.

Claims 4-7 and 18-21 respectively depend from independent claims 1 and 17, and Applicants respectfully submit that these claims are patentable over the applied prior art at least for the same basis that claims 1 and 17 are patentable over the applied prior art. Applicants, therefore, respectfully submit that the imposed rejection of claims 4-7 and 18-21 under 35 U.S.C. § 103 for obviousness is not viable and, hence, solicit withdrawal thereof.

**Claims 22-62 are rejected under 35 U.S.C. § 103 for obviousness based upon Mitsui in view of Nagatani, Isao, and Yamanishi, and further in view of the publication to Angelopoulos**

In the fourth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the teachings of Mitsui in view of Nagatani, Isao, Yamanishi and Angelopoulos to arrive at the claimed invention. This rejection is respectfully traversed.

Claims 23-26 are dependent from independent claim 17, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 17 under 35 U.S.C. § 103 for obviousness based upon Mitsui in view of Nagatani, Isao and Yamanishi. Specifically, the Examiner has failed to establish any facts that would have realistically motivated one having ordinary skill in the art to use a reactive long throw sputtering device for forming a phase shifter film. Independent claims 38, 45, 60 and 61 additionally include this distinguishing limitation. The Examiner's reference to Angelopoulos, however, does not cure the argued deficiencies of Mitsui, Nagatani, Isao and Yamanishi. Applicants, therefore, respectfully submit that the imposed rejection of claims 22-62 under 35 U.S.C. § 103 for obviousness based upon Mitsui in view of Nagatani, Isao, Yamanishi and Angelopoulos is not viable and, hence, solicit withdrawal thereof.

Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. However, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the



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prosecution of the application to an allowance. Accordingly, and in view of the foregoing remarks, Applicants hereby respectfully request reconsideration and prompt allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417, and please credit any excess fees to such deposit account.

Respectfully submitted,

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